MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2016/2017

PPS0016 – INTRODUCTION TO PROBABILITY AND STATISTICS

(All Sections / All Groups)

31 MAY 2017

9:00 AM – 11:00 AM

(2 Hours)

GENERAL INSTRUCTIONS:

1. This exam paper consists of **5 pages** (including the cover) with **5 questions only**.
2. Each question is worth **20 marks. Attempt ALL questions.**
3. A normal distribution table is provided in the appendix.
4. Write all your answers in the answer booklet provided. **Show all relevant steps** to obtain maximum marks.

Question 1

(a) Based on the given samples in the Table 1 below, compute the mean and median

Table 1

x	Frequencies
0	2
1	2
2	3
3	1
4	2

[5 marks]

(b) The following data were collected from a survey on the HDL cholesterol levels of **16** persons.

5.5	8.6	11.7	14.0	17.3
5.7	11.0	12.0	17.1	14.1
8.0	14.8	12.3	17.2	12.0
20.1				

(i) Construct a frequency distribution table based on the format given below:

Class	Class Boundaries	Class Midpoint, m	Frequency, f	mf	m^2f
5.5 – 8.5					
8.6 – 11.6					
⋮					

[10 marks]

(ii) Calculate the approximate sample mean and sample variance.

[2 + 3 marks]

Question 2

(a) The following table shows the number of accident cases in the month of February 2017 in the district of Sepang. It involves various types of vehicles. The total number of cases is **52**:

Table 1

Vehicles Involved	Number of Cases
Motorbike	33
Car	40
Motorbike and Car	x
Bus	5

(i) Draw a Venn diagram representing the information in Table 1. Define all the symbols used.

[5 marks]

(ii) Determine x, the number of accident cases involving motorbike and cars.

[3 marks]

(b) A group of 3 senior and 4 junior players are available for a coach to select in order to form a bowling team.

(i) A team of 3 is to be chosen from the available players with the condition that the team must consist of senior and junior members. How many ways can a team of 3 be formed with the given condition?

[6 marks]

(ii) Two players are randomly selected, one after the other. If the second player selected is a senior, what is the probability that the first player selected is a junior? [Hint: draw a probability tree diagram and/or a contingency table]

[6 marks]

Question 3

(a) A batch of 145 handphones contains 11 that has defective battery. A random sample of 3 handphones are selected. Let X be the discrete random variable denoting the number of defective handphones found in the sample.

(i) Construct the probability distribution table for X. Use the format in the example given below.

Number of defective handphones, x	Probability, $f(x)$

[7 marks]

(ii) What is the probability of finding **more than one** defective handphone in the sample?

[3 marks]

(b) A continuous random variable X has a probability density function given as

$$f(x)=\begin{cases} k(1-x^2) & -1\le x\le 1 \\ 0 & \text{elsewhere} \end{cases}$$

(i) Find the value of the constant k.

[5 marks]

(ii) Find $P\left(X\ge\frac{1}{2}\right)$

[5 marks]

Question 4

(a) Suppose that 30% of all chickens inspected in a farm tested positive for avian flu. Five chickens from this farm are selected at random.

(i) Find the probability that at most four of the selected chickens will test negative for avian flu.

[3 marks]

(ii) Calculate the standard deviation of the number of selected chickens that will test positive for avian flu.

[2 marks]

(b) A telecommunications service provider Yo-Mobile has determined that on average, it receives 2 customer complaints per day. Find the probability that Yo-Mobile receives at least five complaints within a 3-day span.

[6 marks]

(c) A company has estimated that the mass of its portions of sirloin steak cuts has a mean of 454g and a standard deviation of 91g. Assume that the mass of the portions of sirloin steak cuts follow a normal distribution.

(i) Find the probability that a random portion of sirloin steak cut produced by this company has a mass between 400g and 500g.

[5 marks]

(ii) What percentage of the portions of sirloin steak cuts produced by this company has a mass of 400g or less?

[4 marks]

Question 5

(a) The average printing rate of a certain brand of printer is 40 pages per minute with a standard deviation of 8 pages per minute. Assume that the printing rate follows a normal distribution.

(i) Find the probability that the mean printing rate of a random sample of 60 such printers falls between 37 and 39 pages per minute.

[5 marks]

(ii) Find the value of k such that $P(\overline{X} > k) = 0.80$, where $\overline{X}$ is the average printing rate of a sample of 40 such printers. Give your answer to one decimal place.

[7 marks]

(b) Suppose that 85% of repeat students who receive buddy tutoring went on to pass their respective subjects. Calculate the probability that from a sample of 50 such students, at least 90% of them went on to pass their respective subjects.

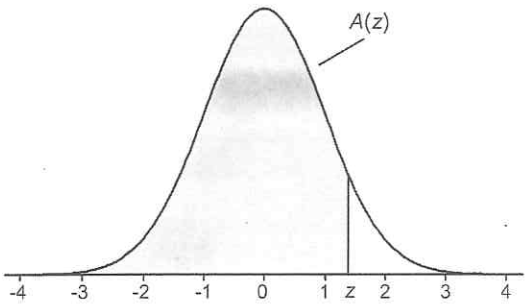
[8 marks]

End of paper

Appendix

TABLE A.1

Cumulative Standardized Normal Distribution



$A(z)$ is the integral of the standardized normal distribution from $-\infty$ to z (in other words, the area under the curve to the left of z). It gives the probability of a normal random variable not being more than z standard deviations above its mean. Values of z of particular importance:

z	$A(z)$	
1.645	0.9500	Lower limit of right 5% tail
1.960	0.9750	Lower limit of right 2.5% tail
2.326	0.9900	Lower limit of right 1% tail
2.576	0.9950	Lower limit of right 0.5% tail
3.090	0.9990	Lower limit of right 0.1% tail
3.291	0.9995	Lower limit of right 0.05% tail

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998
3.5	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998
3.6	0.9998	0.9998	0.9999							